some degree upon the subjects to which I have referred. Among these I may mention such subjects as that of the creation of a teaching University for the City of London. I should not say for the city, but for London itself; and for the whole country some reorganisation of its secondary education, which is the indispensable foundation of any progress towards higher scientific study. I myself entertain a strong conviction that these are subjects of far greater importance than a great many which excite much more general and widespread interest. But strong as my own conviction, or the convictions of my colleagues, upon these subjects may be, I am not here to hold out to you any sanguine hope that we shall be able to induce Parliament to devote to them the attention which these subjects, in my opinion, richly deserve. Certainly we shall not be able to induce Parliament to give them the attention which they demand and require unless we can create in the country a widespread public opinion of their importance and their necessity. I think that many of those I have the honour of addressing, who stand at the head of the scientific professions, may be able in these matters to render great assistance to the Government by guidance, counsel, or advice, and, by helping us, thus assist to create throughout the country a public opinion of the importance of these matters. I think you can assist us in bringing home to the minds of many who have hitherto given, perhaps, an incomplete consideration to these questions the fact that that country cannot prosper which neglects the prosecution of either the higher or the subordinate branches of scientific research, or which is indifferent to the scientific training of those who are destined in the near or even the more distant future to conduct the industrial and commercial enterprises of this Empire. I will not trespass further upon your time except to thank you in the name of my colleagues for the very cordial manner in which this toast has been proposed for your acceptance by Sir John Evans and for the manner in which you have received it.

The American Ambassador in rising to propose the health of the Royal Society, said:—I can only follow at a great distance the example set by his Grace the Duke of Devonshire, and apologise at the beginning for my lack of qualification to address such an assembly as this. I regret that I have not even that smattering of scientific knowledge which would enable me to put on an appearance even of saying anything instructive or amusing. The only reason why I do not stand entirely mute is that I am unwilling by silence to seem indifferent to the great compliment which has been paid me in assigning to me this honourable duty. It is in associations of men like this, in institutions like the Royal Society, and similar bodies in America, of course of more recent date and of narrower resources, that there exists one of the strongest bonds of union that unite the two great branches of our race. They are held together by a common love and pursuit of universal truth, by devotion to the highest interest of mankind, by a kindred passion for light and progress. In your pursuits there is everything that unites and nothing that divides. The results of science are all gain and no loss. The triumphs of war are bought by the tears and anguish of both sides. The success of diplomacy and trade are often attended by the discomfiture of one party. But the whole world is brightened and made more livable by the achievements of a Faraday, a Morse, or a Fulton. The genius of a Lister or a Morton lessens incalculably the whole vast sum of human suffering, and every invention or discovery on either side of the sea—the product of the patient, self-denying labour of any of the scholars of our race, whether it be Lord Kelvin or Edison, Bessemer or Graham Bell, Huxley, Tyndall, or Marsh—is at once thrown into the common stock of the world's intellectual riches, profiting every one and injuring none. It is for this reason that I—although I have no claim to sit among scholars or men of science—am glad to be allowed to come here and pay my humble tribute of profound respect to those eminent men who, under the auspices of this venerable institution, are doing so much to hasten the glad day when all misconceptions and misunderstandings, born of ignorance and prejudice, shall fade away in the light of dawning truth and widening knowledge; when, to use the language of your great poet, who was himself through life a patient and devoted student of science, "Universal Peace" shall

> Lie like a shaft of light across the land,
> And like a lane of beams athwart the sea.

I have the honour to propose the health of the Royal Society, and to couple with the toast the name, honoured and revered in every country upon earth where high genius, devoted to the loftiest purposes, is valued and appreciated—the name of Lord Lister.

The President responded, and afterwards proposed the toast of "The medallists," to which Prof. Forsyth replied. The dinner terminated with the toast of "The guests," proposed by Lord Kelvin, and responded to by Prof. Lewis Campbell.

USEFUL INSECT PRODUCTS.

THE commercial value of the insects from which cochineal, lac, and Japanese white wax are obtained were briefly referred to, by Dr. L. O. Howard, in the course of a short paper on a useful American scale insect, read at the last meeting of the Association of Economic Entomologists. It was pointed out that for many years the cochineal or cactus scale insect, now called *Coccus cacti*, was used as the basis of an important red dye, until practically superseded by the introduction of aniline dyes. In the same way the European Porphyrophora was used in the production of a purple dye. Aside from the dye insects, we have the lac insects, of which a single species, *Tachardia lacca*, produces practically all of the shell-lac, stick lac, and button lac of commerce. This species is Asiatic in its distribution; but in the south-west States, upon the very abundant creosote bush, a lac insect occurs in an enormous quantity, the commercial possibilities of which have not been developed. This is the congeneric species, *Tachardia larreæ* (Comstock). This insect has been known to science only since 1881, but was long prior to that time known to the Indians, who for many years have been in the habit of collecting the scale insects and forming them into more or less elastic balls, which their runners were in the habit of kicking before them as they journeyed from one point to another. There are other species of the same genus inhabiting North America. The third substance of commercial importance derived from scale insects is a pure white wax, which is secreted by the Chinese and Japanese *Ericerus pé-la* and by the Indian *Ceroplastes ceriferus*. On account of its expense, and on account of more or less available substitutes, this wax has not become of great commercial importance in Europe, but is much used in the Eastern countries, both in the making of wax-candles and in medicine. The Chinese wax is said to have ten times the illuminating power of other waxes. It is a beautiful wax, resembling beeswax in its chemical composition more nearly than the vegetable waxes, and is clear white in colour. Dr. Howard calls attention to the fact that in the far south-west of the United States there is a wax insect (*Cerococcus quercus*) which apparently needs careful investigation from the commercial point of view. Three species of oak are recorded by Prof. Comstock as offering food for this insect, viz. *Quercus oblongifolia*, *Q. undulata* variety *wrightii*, and *Q. agrifolia*. Dr. Howard recently received specimens of the insect from Mesa Grande, California. They were not sent in position on the twigs, but had been removed from the twigs, and compressed together by hand into a more or less pliable lump, somewhat resembling a lump of india-rubber, but not possessing the same elasticity. The substance, it is remarked, makes an admirable chewing gum, as it takes and retains flavours better than other gums. Part of it has been proved by chemical analysis to be a true wax, and part resembles rubber in its physical properties. The product is not only interesting from a chemical standpoint, but it may prove to be also of economic value, as the supply is well-nigh inexhaustible. By directing attention to these products of potential importance, Dr. Howard demonstrates the commercial uses of entomology.

THE RAINFALL OF SOUTH AFRICA.

A SHORT time ago the Meteorological Commission of Cape Town placed in the hands of Dr. Alexander Buchan the rainfall statistics obtained at 278 stations in Cape Colony during the ten years 1885–1894, in order that he might analyse and discuss them. Dr. Buchan has now completed his task, and the results are given in a publication just received from the Meteorological Commission. The report contains sixteen maps printed in different shades of blue to exhibit the rainfall in South Africa (from lat. 25° to 35° S.) for every month of the year, the maximum annual rainfall, the minimum rainfall, the mean annual rainfall, and the range of mean annual rainfall. All the infor-

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mation which the statistics are capable of affording has thus been extracted from them, and is shown graphically upon this series of maps.

In a brief introduction to the tables and maps, Dr. Buchan refers to a few points of interest to meteorologists and physiographers. It appears from this, and the map of mean annual rainfall, that the annual distribution over South Africa, to the north of the latitude of Clanwilliam, steadily increases from west to east, the amount on the Atlantic coast falling short of five inches a year, whereas on the east coast, for some distance to the north and south of Durban, it exceeds forty inches. From Philadelphia, a little to the north of Cape Town, all along the south and south-eastern coast (with the exception of a small portion from Cape Agulhas to Mossel Bay), and for some distance inland, the annual rainfall exceeds twenty inches. These southern slopes appear to be, longitude for longitude, the best watered portions of South Africa.

Dr. Buchan studied the statistics with reference to the sunspot period; and with reference to the subject reports as follows;—

Sunspot Period of the Rainfall.

"In order to see what connection may be between the sunspot period and the rainfall of Cape Town, the annual amounts are thus arranged:—

"Table showingthe difference of each year's rainfall from fifty-four years' average of 25·82 inches.[1]

Year of period	1	2	3	4	5	6	7	8	9	10	11
	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1842–43 ...	...	...	...	...	...	...	...	..	...	**·45**	·99
1844–54 ...	7·05	4·91	3·31	3·43	2·56	1·20	**7·65**	5·52	2·60	4·59	5·76
1855–65 ...	1·24	6·34	3·78	3·54	**10·91**	**3·31**	·36	**6·18**	·21	6·90	7·14
1866–76 ...	6·61	2·87	5·86	**6·52**	**2·24**	5·70	**3·51**	2·05	**·38**	·10	**·83**
1877–87 ...	**9·75**	**15·21**	7·07	8·11	·21	**3·49**	**6·24**	**2·47**	**2·10**	**2·03**	2·74
1888–94 ...	**10·24**	**5·16**	**·52**	**4·48**	**15·10**	2·40	3·27	...	...	..	...
Means ...	**1·02**	**1·25**	4·90	·42	**5·10**	**·50**	**2·75**	**·27**	·08	1·82	3·16
Means Bloxamed	·30	·88	1·36	·07	**1·73**	**2·78**	**1·17**	**·98**	·54	1·69	1·32

"The individual years' rainfall shows sudden transitions in amount from year to year. Thus 1877 and 1878 show respectively 9·75 inches, and 15·21 inches of excess above the average; whereas the two following years, 1879 and 1880, show 7·07 inches and 8·11 inches of deficiency. These two pairs of consecutive years are, further, the greatest departures above and below the average annual rainfall of the whole fifty-four years.

"The means of the eleven-year period have been 'bloxamed' thus, 1st year $= \frac{11+1+2}{3}$, 2nd year $= \frac{1+2+3}{3}$, and so on. The smoothed curve thus obtained is a remarkable one. The rainfall is above the average in the fifth, sixth, seventh, and eighth years of the sunspot period, but under the average in the other years. The curve further shows two maxima and two minima. The smaller maximum occurs on the first year, thence the rainfall diminishes to the smaller of the two minima on the third year; then gradually rises to the principal maximum, 2·78 inches above the average, on the sixth year; and thereafter steadily falls to the principal minimum, 1·69 inch below the average, on the tenth year. There is thus a difference of 4·47 inches between the annual rainfall of the wettest and driest years of the sunspot period. The steadiness of the increase and decrease of the rainfall during the period is the most remarkable feature of the curve. It must, however, be noted that the extreme irregularity of the annual amounts from year to year cannot be said to hold out a hope that the cycle can be turned to practical account in forecasting dry and wet years."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—Mr. F. Harrison (New Coll.) has been appointed Examiner in Mechanics and Physics, Mr. W. W. Fisher (C.C.C.) in Chemistry, and Mr. C. H. Barks (Camb.) in Botany, for the preliminary examination in the Final Honours School of Natural Science.

Convocation has directed that 600*l.* a year be paid to the Visitors of the University Observatory for its use for the next five years, beginning January 1, 1898.

The following grants have been made to the Botanical Department: (1) for the Herbarium, Library, and Museum such a sum as will, with the Fielding Fund, make up 400*l.* a year; (2) 650*l.* a year for the Botanic Garden. The grants extend over the years 1898–1900.

The Professor of Chinese, James Legge, died on Monday at his residence in Oxford.

Mr. J. O. Griffiths, of Llandovery College, has been elected to a Mathematical Scholarship, and Mr. O. T. Falk, of Rugby, to an Exhibition at Balliol College. Mr. E. W. Shobridge, Bradford Grammar School, has been awarded a Mathematical Scholarship at Queen's College, and Mr. F. R. Sandbach to one at Corpus Christi College. At Hertford College, Mr. H. A. Brown, of Plymouth College, has obtained a Mathematical Scholarship, and Mr. R. Cambridge an Exhibition.

Mr. G. Priestley, of Eton College, has been elected to a Natural Science Scholarship, and Mr. S. Douglas, of Wyggeston School, Leicester, to an Exhibition at Christ Church.

THE Russian Government has granted 400,000 roubles for the construction of a chemical laboratory at the Polytechnic Institute at Riga.

A COURSE of ten Thomson Lectures on Magnetism will be given at the Free Church College, Aberdeen, by Prof. J. A. Ewing, F.R.S., from December 9–22.

DR. F. STANLEY KIPPING, F.R.S., Lecturer and Assistant in the Chemical Research Laboratory of the Central Technical College, has been appointed to the Professorship of Chemistry in University College, Nottingham.

PRESIDENT SETH LOW, at the request of the trustees of Columbia University, has withdrawn his resignation, which was presented before the election in order to leave him unembarrassed in the canvass; he will, therefore, continue to preside.

WE learn from *Science* that the Technical Institute in Munich has been given by the Government 175,000 marks for enlarging the electro-technical laboratory, 150,000 marks for the erection of a laboratory for the agricultural station, and 170,000 marks for enlarging other buildings.

THE Root Hall of Science and the Benedict Hall of Languages of Hamilton College were dedicated a few days ago. The former, which cost 31,000 dollars, was the gift of Mr. Elihu Root, and the latter, which cost 30,000 dollars, of Mr. H. H. Benedict, both of New York City.

THE Council of the College of Preceptors have arranged a number of lectures to be delivered between January 4 and January 14, and visits to Educational Institutions, for teachers (especially Secondary Teachers), who will be in London at that period. Among the subjects of the courses of lectures are the principles of class teaching, by Mr. J. J. Findlay; and the teaching of science, by Dr. C. W. Kimmins. This course will have special reference to the Headmasters' Association's syllabus of physics and chemistry. An address on eyesight in relation to school life, will be given by Dr. W. S. Colman; and one on circulating school museums, by Mr. E. Howarth. There will also be an exhibition of geographical lantern slides, specially prepared for the Geographical Association, by Mr. B. B. Dickinson.

AT the annual meeting of the Scottish Association for the promotion of Technical and Secondary Education, held in Edinburgh on Saturday, the President, Lord Reay, delivered an address on the necessity of paying more attention in this country to organising and systematising technical education. In the course of his remarks he said that though the Victorian era had been rich in men of the highest scientific eminence, other nations not possessing men of equal eminence had enriched themselves by the teaching of the men who filled such glorious pages in our history. In chemistry, in physics, in electricity, in geology, in astronomy, the most illustrious names of Scotsmen and Englishmen could be mentioned, but when it came to the adaptation of their teaching in the school, in the workshop, on large landed estates, they had to go to Germany, to the United States, to Switzerland, and to Belgium. Our system of education ought to

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[1] The heavy type indicates an excess or plus amount, and the light, a deficiency or minus quantity as compared with the mean.

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